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(54) **Space heating apparatus with means for simulating combusting fuel**

(57) Space heating apparatus comprises means for providing holographic images to simulate combusting fuel. A holographic plate or film may have a series of holographic images recorded on it (e.g.) by making consecutive holograms at timed intervals, from the same or different viewpoints, of a combustion effect such as flickering flames or glowing embers, etc. These images are perceived by a user when the plate or film is subsequently illuminated with light (e.g.) having different angles of incidence or reflection.

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HEATING APPARATUS WITH MEANS
FOR SIMULATING COMBUSTING FUEL

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This invention relates to heating apparatus including means for simulating combusting fuel. The heating apparatus may include any means for producing a thermal output, for example, a radiant heater and/or convector and/or a fan heater powered by electricity, gas, or any other means and the apparatus may be, for example, free-standing, mounted on a surround, wall-mounted or provided in any other form.

Conventional means for simulating combusting fuel typically includes a semi-translucent cover in the form of a plastics moulding shaped and decorated to resemble pieces of fuel and a housing on which the cover is mounted and which contains a red or orange tinted electric light bulb and a light circular, multi-blade fan centrally mounted on a pivot pin above the bulb. The fan rotates due to thermal convection currents generated by the heat of the bulb and this provides a flickering effect which simulates, in a crude way, a glowing coal or log fire. However, such conventional means have at least the following disadvantages. The simulation of burning fuel is not really convincing. Dirt and dust can build up on the cover, e.g. due to local convection currents and this considerably diminishes any realism. The plastics cover can also be seen to be a very poor imitation of simulated burning fuel when the appliance is switched off, e.g. during the summer.

Our co-pending application No. 8620991 describes means for providing an improved "fire effect" which counteracts such problems. Such means comprises first and second reflective means arranged to provide front-to-back multiple images of simulated fuel which are illuminated by a light source. The first reflective means is capable of transmitting light as well as reflecting light and this has the advantage that the "fire effect" is substantially

hidden when the light source (illuminating the simulated fuel) is switched off. Moreover, the first reflective means, which may be provided in the form of a glass sheet, can be used to protect the "fire effect" and thereby prevent the ingress of dirt and dust. The "fire effect" is also more realistic than the effect due to the conventional means described above.

Despite the advantages of the latter arrangement, even more realism is particularly desirable, especially where this can be achieved without imposing too many constraints on the design of the heating apparatus. The present invention seeks to solve this problem.

In accordance with the invention, heating apparatus comprises means for simulating combusting fuel, the apparatus being characterised in that the simulating means provides a holographic image or images of combusting fuel.

The invention may be embodied in various ways. For example, a holographic plate or film may be fixed to an internal wall of the heating apparatus so that it can be seen from the front of the apparatus. The holographic plate or film is then illuminated with, for example, light having consecutively different angles of incidence so that an observer perceives correspondingly and consecutively different holographic images simulating the combusting fuel.

The holographic plate or film may be made, for example, by forming holograms, at timed intervals, of actual combusting fuel, on the same holographic plate. Such holograms may be taken with light having different angles of incidence (e.g. so that the plate 'sees' the fuel from different viewpoints), or reflection (e.g. where

the orientation of the plate is varied between taking consecutive holograms from the same viewpoint), whereby holographic images can be reproduced when the plate is illuminated (e.g.) with light having different angles of incidence.

The term "combusting fuel" is intended to cover various effects including, for example, flickering flames; smoke; glowing embers and/or; burning wood, coal or coke or combinations of these effects. Whilst different effects may be provided on different holographic plates, it would be possible to provide more than one effect on the same plate and means for controlling the incident angle of the light so that different effects could be selected by the user.

The holographic plate may be flat or curved and more than one plate may be employed, e.g. a rear plate and two side plates. The shape and number of plates used will depend on the desired visual effect.

Means for providing light having different angles of incidence may be embodied in various ways. For example, a stationary light source may be used with optical means which is controlled or moved so as to change the angle of incidence. Such optical means may comprise a moving reflecting surface. For example, a rotating reflecting surface can be provided in the form of a reflective vane or vanes, made of metal or glass, which are part of a light fan which is driven by convection currents, due to the heat generated by the light source or by the appliance in which the fan is fitted. Alternatively, a motor could be used to move or to rotate a reflecting surface.

The light source could also incorporate means for producing beams of light having different colours (e.g. by using filters, lasers, beam-splitters, etc.). This may be done either to achieve a visual effect (with colour) or to provide light having different wavelengths which could then be directed through e.g. a prism or prisms in order to provide different angles of incidence.

The position of the light source could also be effectively varied with respect to fixed or moving reflecting or refracting means e.g. by employing a plurality of light sources and means for sequentially switching the sources on and off to effectively change the position of the illuminating source.

A stroboscopic light source may be used either with or without filters and with either fixed or moving reflecting or refracting means. In particular, the strobe frequency may be selected with regard to (e.g.) the angular velocity of a rotating mirror so that holographic images are perceived in the manner of cinematography.

Instead of using a holographic plate or plates, means may be provided for projecting a hologram onto a surface of the heating apparatus. However, this is likely to be more expensive than using holographic plates or films.

According to an alternative arrangement, means may be provided for moving a holographic plate or film or a plurality of holographic plates or films which are illuminated by a fixed light source whereby the angle of reflection could be changed with respect to the eyes of the observer. It will be understood that this provides an alternative way of causing different holographic images to be perceived by the observer.

Means may also be provided to introduce a random effect into the holographic images perceived by the observer. This obviates a repetition of the same cycle of holographic images and thereby enhances the simulation of combusting fuel. A random factor may be introduced by means for randomly varying the angles of incidence or reflection, and/or the colour of the light, and/or the speed at which light is switched on and off, or the speed at which reflecting or refracting devices are moved, or by electronic control of the power input to the light source, or any combination of these.

Clearly, many modifications and variations are possible in order to achieve different optical effects but the choice of components may be decided with regard to cost. In the latter regard, thermal motors, e.g. devices which produce a drive due to the heat generated by the heating apparatus, may be used advantageously to avoid the cost of more expensive means for providing switching or driving functions.

CLAIMS

1. Heating apparatus comprising means for simulating combusting fuel, characterised in that the simulating means provides a holographic image or images of combusting fuel.

2. Apparatus according to claim 1 wherein said simulating means comprises one or more holographic plates or films which are visible by a user.

3. Apparatus according to claim 2 including a light source and means for providing relatively different angles of incidence between said light generated by said source and said holographic plates or films whereby consecutively different holographic images are perceived by the user.

4. Apparatus according to claim 2 including a light source and means for providing relatively different angles of reflection between light received by said plates or films from said source and a viewing point external to said apparatus whereby consecutively different holographic images are perceived by the user.

5. Apparatus according to claims 3 or 4 including means for reflecting or refracting light from said source which reflecting or refracting means provides different angles of incidence for light received by said holographic plates or films or different angles of reflection for light reflected by said plates or films.

6. Apparatus according to claim 5 including means for rotating said reflecting or refracting means.

7. Apparatus according to claim 3 or 4 including means for producing light of various colours, said light being generated either for its visual effect or to provide light having different wavelengths for the purpose of causing different holographic images to be perceived by the user.

8. Apparatus according to any of claims 2-7 including a light source and means for effectively causing light from said source to be intermittently received by said holographic plates or films.

9. Apparatus according to any of claims 2-7 wherein said holographic plates or films have more than one kind of image recorded thereon and further including means for causing a particular kind of image to be perceived by the user.

10. Apparatus according to any of the preceding claims including means for providing random holographic images.